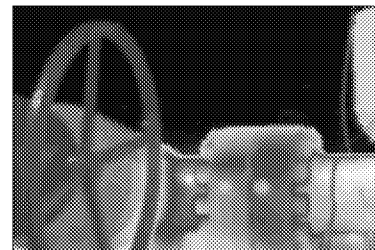
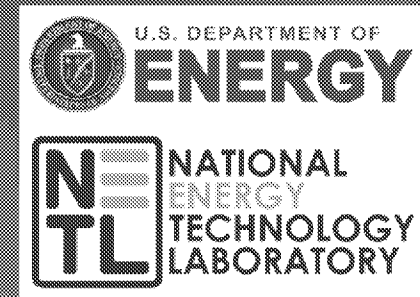


# QUANTIFICATION OF METHANE EMISSIONS FROM MARGINAL OIL & GAS WELLS

DOE NETL Project DE-FE0031702

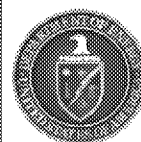


**Ann P. Smith, P.E., BCEE, [apsmith@gsi-net.com](mailto:apsmith@gsi-net.com)**  
**Richard L. Bowers, P.E., BCEE, [rlbowers@gsi-net.com](mailto:rlbowers@gsi-net.com)**  
**GSI Environmental Inc.**



**Richard C. Haut, Ph.D.,**  
**[rhaut@rpsea.org](mailto:rhaut@rpsea.org)**

# PROJECT TEAM



U.S. DEPARTMENT OF  
**ENERGY**



NATIONAL  
ENERGY  
TECHNOLOGY  
LABORATORY



- Lead research, data mining, acquisition, and analysis



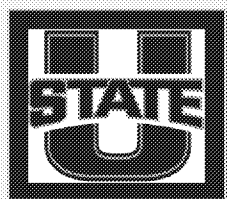
- Coordinate with stakeholder groups



- Lead field investigation activities



- Perform third-party technical reviews

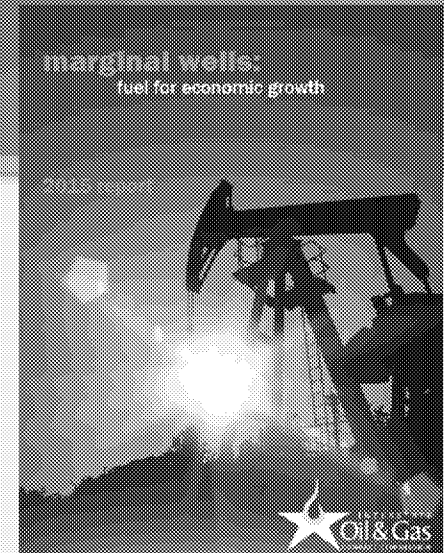


- Support field investigation activities

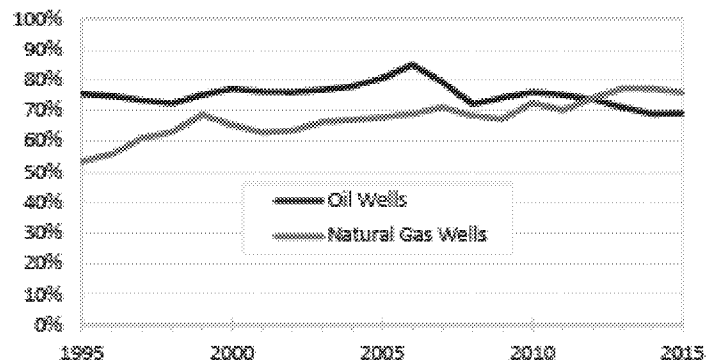
# MARGINAL WELLS

## Fast Facts

- Oil or gas well with low production rates/high production costs (IOGCC 2015)
- Produce <90 MCF gas or <15 bbl oil per day (EPA 2016)
- ~790,000 marginal wells represent 69% US oil and 76% US gas wells and 8% total production) (IOGCC 2015)
- Produce more oil than U.S. imports from the middle east
- Conventional/marginal wells provide access to twice as much oil as U.S. has ever produced.
- *Most non-marginal wells will grow up to be marginal wells some day!*

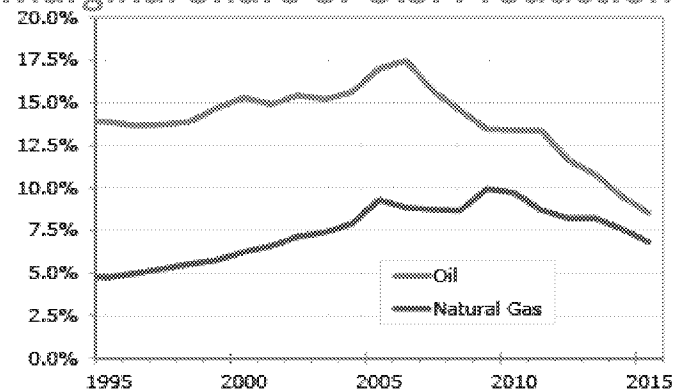


Marginal Share U.S. Wells



Source: U.S. EIA, World Oil, and RegionTrack

Marginal Share of U.S. Production



Source: IOGCC Marginal Well Survey, U.S. EIA, and RegionTrack

# NEW SOURCE PERFORMANCE STANDARD

## 40 CFR 60, Subpart 0000a

### Issue

- **Marginal Wells** (<15 bpd oil or <90 MCF/d gas) no longer exempt from costly leak detection and repair requirements (LDAR)
- EPA decision based on very limited study data

### Response

- Objective, transparent, repeatable, and reliable emissions measurements from marginal vs. non-marginal well sites

#### Federal Methane Regulations

### EPA Deletes Marginal Well Exemption

By Del Torkelson

WASHINGTON—U.S. Environmental Protection Agency Administrator Gina Mc

analysis—which estimates \$690 million in benefits against \$530 million in costs by 2025—assumes a \$4 an Mcf value for the additional natural gas that producers are

is a huge mistake on the administration's part, and a bad decision that we argued against aggressively in our work with the Small Business Administration advo

reflected in some of the allegations.

However, Reeves suggests, common sense does not always trump actual data. "I think EPA is looking for quantitative data and has put the onus back on the industry, basically saying, 'If you really think these sites are not a source of emissions, gather some data and make your case,'" she characterizes. "As silly as it sounds, EPA's theme seems to be 'show us the money.' Unfortunately, these days, no one in the industry has much money."

KEY

OBJECTIVE:

Support common sense regulation based on sufficient, defensible data.



# LDAR MONITORING FOR MARGINAL WELLS

## *O&G Industry Concerns*

### *Implications of New Source Performance Standards (Subpart OOOOa) applied to Marginal Wells*

- Loss of an estimated 57,560 O&G jobs and \$4.4 billion in direct earnings (IOGCC 2015)
- Perpetual administrative/operating cost:  
*~\$3,400 /site/year for biennial monitoring (ICF 2016)*
- Incentive to shutdown vs. modify wells  
(production loss)
- Limited number and high expense of *Qualified Professional Engineers* to certify engineering modifications: *~\$3,000/installation (IPAA 2018)*
- Difficulty securing necessary equip and/or personnel to conduct req'd monitoring at proposed frequency:  
*<60 after startup or mod, biennial thereafter, and upon repair.*



# STUDY QUESTIONS TO ANSWER



- **How do marginal vs. non-marginal wells compare in terms of:**
  - Production rates?
  - Type and quantity of equipment?
  - Frequency/timing of episodic high-emission events?
  - Equipment type/age/condition?
  - Absolute contribution to total emissions?
- **Correlations of site characteristics to emissions**
- *How significant are marginal wells emissions?*

**KEY POINT:** Need equipment-specific analysis to compare marginal vs. non-marginal wells.

# PROPOSED MARGINAL WELLS STUDY

## *Overall Approach*

### ■ **Desktop Study / Data Mining** (3 mo.)

- Literature and operator surveys
- Database compilation / statistical analysis

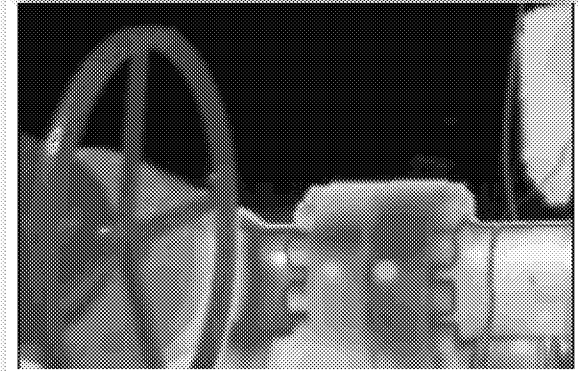
### ■ **Field Investigations** (~12 mo.)

- Statistically-based sampling design
- Multiple production basins/regions
- Established measurement protocols

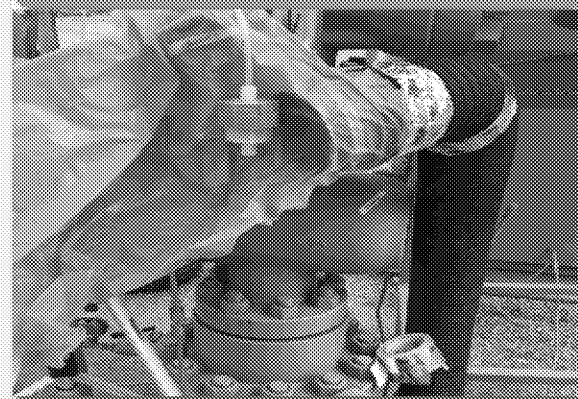
### ■ **Messaging and Communication**

- Engagement with industry, state regulators, EPA, etc.

*Optical Gas Imaging*

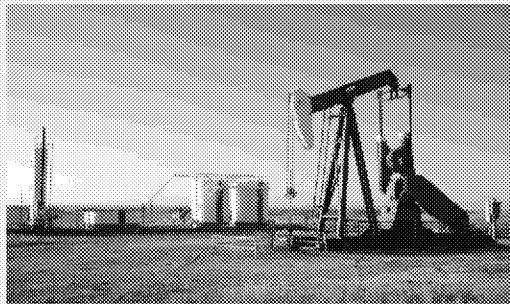
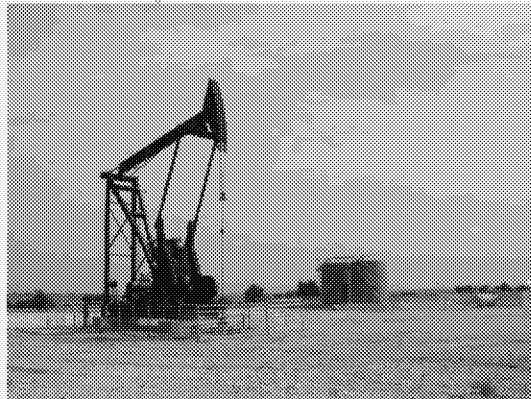


*Emissions Measurement*



# NATIONWIDE BLINDED OPERATOR SURVEY

Quick  
and Easy



- **Activity Data**
  - Production type and rate (bbl oil / MCF gas)
  - Liquid unloading frequency (& plunger type)
  - Condensate flashing frequency
- **Equipment type/count/condition**
  - Wells (oil, natural gas, both)
  - Compressors (size and type)
  - Atmospheric storage tanks
  - Separators
  - Dehydrators
  - Flares/ thermal combustors
  - Existing emissions control devices



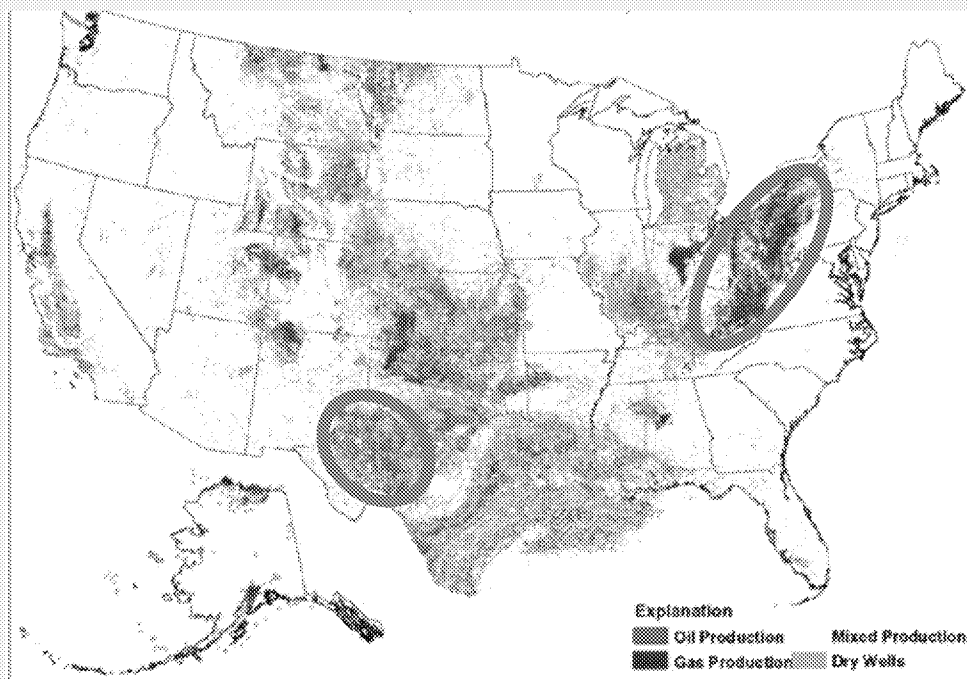
Confidential

Collaborative

**KEY POINT:** *More data from more responses will produce better results.*

# REGION-SPECIFIC FIELD CAMPAIGNS

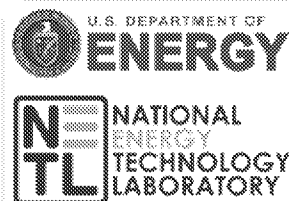
## POTENTIAL REGIONS



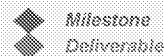
- Statistically sound site selection criteria
- Emissions screening and measurements
  - *Established protocols*
  - *Experienced field teams*
- Quantify marginal vs. non-marginal well site emissions
- Produce basin-specific results from multiple regions

**KEY POINT:** Access to sufficient populations of production sites is critical to obtaining representative data.

# SCHEDULE



Task / Description		Month (2019/2020)															
		M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
Phase I - Project Development																	
1	Project Management and Planning																
	Project Management Plan																
	Data Management Plan																
2	Technical Advisory Steering Committee																
3	Data Source Status Assessment																
4	Master Workplan																
	Data Source Summary Report and Master Workplan																
	Data Source Summary Report/Master Workplan complete																
Go/No-Go Decision Point 1																	
5	Site/Technology Selection																
Go/No-Go Decision Point 2																	
Phase II(a) - Region A Field Investigation																	
6a	Region A Field Campaign Workplan																
	Field Campaign Workplan																
7a	Region A Field Campaign																
8a	Data Processing and Analysis																
	Interim Results Summary - Region A																
	Region A Field Investigation Complete																
Phase II(b) - Region B Field Investigation																	
6b	Region B Field Campaign Workplan																
	Field Campaign Workplan Amendment																
7b	Region B Field Campaign																
8b	Data Processing and Analysis																
	Interim Results Summary - Region B																
	Region B Field Investigation Complete																
Phase II(c) - Region C Field Investigation																	
6c	Region C Field Campaign Workplan																
	Field Campaign Workplan Amendment																
7c	Region C Field Campaign																
8c	Data Processing and Analysis																
	Interim Results Summary - Region C																
	Region C Field Investigation Complete																
Phase III - Reporting																	
9	Comprehensive Project Report																
	Draft Final Project Report																
	Draft Final Project Report Complete																



# STAKEHOLDER PARTICIPATION

## *What we need from you!*



- **Well site data**  
(activity, equipment type/count/condition)
- **Well site access**  
(multiple regions across the US)
- **Technical advisory**
  - **Industry-TASC**  
(industry only)
  - **Other TASC**  
(regulatory agencies, academia, NGOs)
  - **Regional planning committees**
- **Supplemental funding**

### *Company-Level Participation\**

Participation Activity	\$50,000	\$25,000	Site Access	\$0
Industry TASC	X	X	X	X
Regional Planning Committee	X	X	X	
Preliminary results	X	X		
Independent analysis	X			

TASC = Technical Advisory Steering Committee

**Industry-TASC** = participation on all calls (limited to industry representatives)

**Regional Planning Committee** = meetings related to region-specific field investigation planning and logistics

**Preliminary results** = early access to results related to contributing operator's sites

**Independent analysis** = operator's data/sites compared against entire database; recs for methane reductions at operator sites.

\* National and state-wide association participation will be scaled to fit needs.



*Benefit of Participation:* Industry involvement will produce defensible results to address regulatory concerns.





**THANK YOU! QUESTIONS?**



*Ann P. Smith, PE, BCEE*  
**512-346-4474**  
[apsmith@gsi-net.com](mailto:apsmith@gsi-net.com)

*Richard L. Bowers, PE, BCEE*  
**512-346-4474**  
[rlbowers@gsi-net.com](mailto:rlbowers@gsi-net.com)



*Richard C. Haut, Ph.D.*  
**281-787-8768**  
[rhaut@RPSEA.org](mailto:rhaut@RPSEA.org)